neither by fluoroscopy nor by röntgenography. In long standing catarrh the results of poor aëration are seen with the fluoroscope as darker apices which do not clear up on inspiration. In important cases photography, in the shape of diaphragm pictures of the apices, should at once be employed. Beginning infiltrations are frequently recognized by this method which are not recognizable by any other.

4. The height of the apices, in doubtful cases determined by orthodiagraphic measurements, is only of importance when differences of 1 to 1.5 cm. exist. The width of the apices of the lungs has not yet been sufficiently studied röntgenographically to find employment diagnostically. Calcification of the first rib is well shown by diaphragm pictures, and according to Freund can be used as an aid in the diagnosis of incipient tuberculosis. The clearing of the apices with respiration, which is present in health, is frequently lacking on one or both sides in early tuberculosis. Movement of the diaphragm is altered in many ways; a unilateral lagging of the diaphragm on the affected side (Williams' phenomenon) cannot be classed as a special symptom, and, therefore, diagnostically is of no value. Orthodiagraphic measurements are needed. From a diagnostic standpoint the existence of rib shadows in x-ray pictures is either not to be taken into account at all, or if so, only with caution.

B. What x-ray examinations furnish in early tuberculosis of children and young people. In most cases apical findings are wanting; hence the recognition of shadow variations at the hilum are all the more important. These variations are due to bronchial glands enlarged as the result of induration, caseation, and calcification, and infiltration processes in the neighborhood of the hilum and bronchi. Frequently the picture of a central pneumonia following pneumococcic infections is seen in these conditions; then without fever the process, röntgenoscopically at least, slowly adadvances, and after weeks is recognized as tuberculous, both by percussion, auscultation, and bacteriologically.

Furthermore, in well advanced pulmonary tuberculosis x-ray methods of diagnosis furnish very well, frequently surprisingly well, a supplementary picture to the clinical findings, both with the fluoroscope and with x-ray photography. By this method we often see that which we know by autopsy findings, namely, that the tuberculous process is considerably further advanced than we supposed from our clinical examination. If, as so frequently happens, an extensive peribronchial infiltration exists about the main bronchi of the lower lobe, a very characteristic picture is obtained with the fluoroscope. In addition, by means of x-ray diagnosis those infiltration foci which develop from the bronchial glands—clinically they often begin with the picture of a central pneumonia—are found and discovered with certainty. Moreover, they may be recognized positively as tuberculous if they are a direct continuation of the bronchial gland shadows, especially in the adolescent.

As a valuable addition to our methods of diagnosis, it is noteworthy that it is possible by means of the *x*-rays to recognize positively tuberculosis of the bronchial glands, which formerly we guessed at from the interpretation of the clinical picture. Calcified or chalky foci or glands are seen with remarkable clearness as well at the hilum as within the lung; frequently they are as sharply defined as foreign bodies. The recognition of indurated and swollen glands offers more difficulty. The first give a sharp picture with good diaphragming; their recognition requires practice above everything else. Medullary swelling or caseation of glands are only to be differentiated from lung tissue if the glands occur in large masses which project into the lighter lung tissue. I must emphasize, as an absolute necessity, in the *x*-ray diagnosis of bronchial gland tuberculosis, careful clinical observation with the aid of all known methods, the tuberculin reaction, etc. To be sure, the Röntgen picture will show an atypical or pathological condition at the hilum or in the pulmonary glands; but whether it is an active or passive process can only be determined through clinical observations.

We can diagnosticate cavities with great certainty with photographs, but, as a matter of fact, rarely with the fluoroscope. Those cavities can also be recognized which because of their deep position, are otherwise not amenable to diagnosis. That form of tuberculosis which first appears with the clinical picture of caseous pneumonia—dulness of lobar distribution, and loud bronchial breathing, often for a long time without catarrrh—gives a less intense shadow than croupous pneumonia. As a matter of fact, I have only been able to confirm this by autopsy in two cases.

THE TREATMENT OF TINEA TONSURANS.

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Few cutaneous diseases are more obstinate and stubborn to successfully combat than ringworm of the scalp. Because of the anatomical peculiarities in this locality, as well as the character of the usual infecting organism, it is much more difficult to bring about a cure here than in the bearded region. In the majority of instances (about 90 per cent.) Trichophyton microsporon (Audouini) is the hyphomycete which attacks the scalp. First becoming lodged in the stratum corneum, it multiplies there, giving rise to scaling and slight vesiculation. The growth then extends into the hair follicle and down the sides of that cavity, forming a sort of mosiac basket work encircling the bulb. Beneath this collar the cuticle becomes frayed and broken, probably as the result of the action of a keratolytic ferment associated with the presence of the fungus, and allows the mycelium to penetrate into the body of the hair. Multiplication takes place both immediately beneath the cuticle and in the interior of the shaft proper. There is little if any pus formation, and the inflammatory changes in the perifollicular tissues are not, as a rule, marked. On the other hand, the lesions in deep seated tinea sycosis are almost invariably due to infection with the large spored ectothrix, and the tendency to inflammation and pus production, by both the plant itself and the ever-present pyogenic cocci, is very great. The tissues are loose and distensible, and a considerable reaction to the freely liberated toxins is quickly manifested, with resulting development of kerion-like, nodular masses. This process of stimulating the skin to destroy or throw off the fungus constitutes Nature's method of eliminating the disease, and it is a remarkably effective one. The same process is often instituted artificially, especially in those cases in which the scalp is involved, by the application of powerful irritants, such as formalin, chrysarobin, and croton oil. Needless to say, considerable care and skill are required in order to secure only the desired results. Permanent baldness of the affected area is not an infrequent sequel.

The direct method of treatment, in which entire dependence is placed on anti-parasitic remedies, such as sulphur, ammoniated mercury, and the various salts of copper, incorporated in diverse vehicles, is far safer, although extremely slow because of the difficulty experienced in getting the agent to penetrate the entire depth of the hair follicle.

In 1897 Schiff and Freund,[1] of Vienna, suggested the use of the *x*-rays as a depilatory agent, preliminary to the application of the antiseptic, and reported a series of cases successfully treated in this manner. Later, Hahn and Albers-Schönberg,[2] Kienbock,[3] Sabouraud,[4] and others also reported gratifying results, and at the present time the value of the measure is universally recognized. Where the rays are available this combined treatment is undoubtedly the one to be preferred. Sabouraud, who is one of its foremost exponents, gauges the radial dose by means of his "pastilles" (the radiometer of Sabouraud and Noire), and is consequently able to bring about epilation with from one to three exposures, thus minimizing the danger as well as the length of time required for a cure. Unfortunately his mode of procedure has not proved practicable in this country, probably because the indicators, which are manufactured only in France, deteriorate with climatic changes and the lapse of time.

The exposure must be of sufficient length to produce a slight reaction in the deeper layers of the skin and yet not great enough to set up secondary changes which will lead to atrophy of the papillæ and consequent permanent baldness. Inasmuch as the individual susceptibility to this rather imperfectly understood force varies considerably, the dividing line is not nearly so definite and clear cut as could be desired. In the absence of an uncomplicated, practicable instrument for measuring the quality and intensity of the rays, experience, coupled with a considerable working knowledge of the tube to be used, must be relied upon to secure the necessary result.

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[1] Wien. med. Wochenschrift, 1897, p. 856.

[2] Münch. med. Woch., 1900, pp. 284, 324, and 363.

[3] Arch. f. Derm. und Syph., 1901, p. 132.

[4] Annales derm. et syph., 1892; "Les trichophyties humaines," Paris, 1894; "La Dermatologie Topographique," Paris, 1905.

The employment of an energetic antiseptic, both before and for a considerable time after the hair is removed, is to be advised, otherwise the disease is almost sure to persist and continue to spread.

Although the rays exert no direct influence on the fungi, the reaction to which they give rise constitutes an inflammatory process which is destructive to the organisms, while the depilation of the infected hairs not only removes many of the hyphomycetes, but, most important of all, opens up new and essential avenues for the successful application of antiparasitic remedies. It was while in search of these latter, in May, 1907, that my attention was particularly drawn to this subject, and since that time I have been carrying on an intermittent series of experimental inoculations, rabbits being employed for the purpose. The first subject (No. 1) was a male white rabbit, and it required repeated efforts, extending over a period of eleven weeks, to infect him successfully with a small spored ringworm obtained from the hair of a four-year-old patient in the University Clinic. After this experience I confined my attention, in animal experimentation, to the ectothrix.

The two affected patches which finally resulted were roughly oval in outline and measured 0.5 x 1.5 and 1 x 2 cm. One was on the right hip, the other above and in front of the right flank. Both were covered with a short, irregular stubble of broken hairs, the interstices being crowded with fine, grayish white, powdery scales.

There were no inflammatory areolæ, and very little vesiculation. The lower patch, including a 1 cm. margin, was surrounded with lead foil and subjected to an eleven-minute exposure from a Piffard model cancer tube at a low vacuum, the window being placed 6 cm. from the area. Under like conditions a ten-minute exposure is generally sufficient to bring about the desired result on the human scalp.

Ten days later, in the absence of any perceptible reaction, a second exposure, of twelve minutes, was given. Fifteen days after this the long hairs surrounding the area became loosened and commenced to fall out, denudation being complete at the end of a week. The resulting bare surface was equally divided, from above downward, by a line drawn with a sharp-pointed indelible pencil, and the anterior half thoroughly covered with the following mixture: Iodine crystals, 1.75; potassium iodide, 1.25; goose grease, 25.

In explanation I will say that for a considerable time both my associate, Dr. Kanoky (with whom the idea originated) and I have been employing a combination of iodine and mercury for topical antisepsis with most excellent results. The ordinary tincture of iodine is first mopped on the surface, and this is followed, a few minutes afterward, by the application of a 2 per cent. aqueous solution of mercuric chloride. The powerful effect secured is due not to the individual action of either agent alone, but to a third, mercury iodide, an extremely active and powerful, but relatively unstable, salt which is formed at the points of contact.[5] In a previous series of experiments on animals I demonstrated the superior value of goose grease as a skin penetrant.

A portion of each half of the bald spot was excised, under chloroform anesthesia, fastened in a wooden vise microtome block, frozen by means of the ethyl chloride spray, and sectioned in a direction as nearly parallel as possible with the follicles and from below upward. The bits of tissue were immediately transferred to a filtered solution of strained honey (10), glycerin (20), and water (70), and later examined in the same media. Unfortunately, owing to the method of cutting, the sections were too thick for finer differentiation with the oil immersion, and the lenses employed (Ocular 4 and Objectives 4 and 9, Reichert) failed to reveal any inflammatory changes. It could be seen, however, that the iodine

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[5] The reaction which takes place is explained, by Prof. Roy Cross, A.M., M.D., of the Department of Chemisty, as follows:

Formula, No. 1.	
KI	5
I_2	7
Goose grease	100

Formula, No. 2.	
$HgCl_2$	2
Goose grease	100

In No. 1 the iodine dissolves in the goose grease and the KI is mechanically mixed with it. In order that a reaction may take place, a common solvent must be present, and this is furnished by the skin when the ointment is applied. The KI solution then takes up its equivalent of iodine as is present in the formula (see reaction (I) and note *a*).

When the $HgCl_2$ ointment is applied in quantity equal to or greater than No. 1, the complex salt, potassium mercuric iodide, and iodine are formed. The final active agents are practically the K^+ ion, the complex HgI_4^{--} ion, and the molecular iodine. The reactions, with their general mechanism, follow:

(I) $K^+ + \underset{c_1}{I^-} + \underset{c_2}{I} = \underset{c_3}{K^+ I^-}$ ((see note *b*)—the c's represent concentrations.

$$\frac{c_1 c_2}{c_3} = \text{a constant (according to the mass law).}$$

(II) $\underset{c_4}{Hg^{++}} + 2Cl^- 4K^+ + \underset{c_1}{4I^-} = 4K^+ + 2Cl^- + \underset{c_5}{HgI_4^{--}} - \frac{c_4 c_1^4}{c_5}$ a constant (from mass law).

When ointment No. 2 is added reaction (II) takes place and c_1, in both mass law equations, is diminished. Therefore c_2 is increased, or, in other words, molecular iodine is formed.

NOTE *a*.—See laws of distribution—Oswald, "Grundlinien der Inorganische Chemie;" also Nernst, "Theoretical Chemistry."

NOTE *b*.—KI is practically completely dissociated into K ions and I ions in solution, and its properties are dependent upon these ions.

mixture had penetrated to the bottoms of practically all the follicles in the treated area, as well as to a considerable depth in the appended glands. Quite a number of fungi remained in the cavities, along with small portions of broken hair cuticle, and their presence explained the frequency with which re-infection occurs, even when all of the shafts have been removed.

On June 3, 1907, the upper patch, which had not been rayed, was treated with the iodine-goose grease mixture, heat (from a 50 C. P. focussed incandescent lamp) and friction being employed. A half-hour later a 2 per cent. solution of mercuric chloride in goose grease was applied. This gave rise to a slight degree of irritation, which subsided about four days afterward. The application was repeated on the 10th and 17th. On June 30 the patch showed decided signs of improvement. Unfortunately, I had to leave the city and did not see the rabbit again for two months. At that time the skin was apparently normal macroscopically, and it was not possible to outline the former affected area.

In the latter part of September I was able to secure some excellent specimens of the ectothrix from an extensive case of ringworm of the body, the disease having originally been contracted from a pet kitten. The non-cultural differentiation of the corporeal types in man can best be made, as White has pointed out, by the examination of an infected lanugo hair.

Two white rabbits were shortly afterward successfully inoculated from these scales. In both animals the affected areas showed a much greater tendency to become raw and inflamed than in rabbit No. 1. Animal No. 2 developed a large, irregular patch on the right upper shoulder, a smaller, almost circular one on the right flank, and a third, roughly oval in shape, on the left side of the trunk. The area on the shoulder was depilated by one fourteen-minute exposure from the Piffard tube, denudation being practically complete at the end of two weeks. The bare surface was given a thorough coating with the iodine-goose grease mixture, followed by the corrosive sublimate. Three days later a portion from the centre of this patch was excised, prepared for sectioning, mounted in celloidin, cut, and stained by the Unna-Pappenheim method. The signs of inflammation, both in the walls of the follicles and the perifollicular tissues, were not very marked; in fact, the changes were not greater than one would expect to find in ordinary, untreated, ring-worm infected tissue. From these and similar findings made subsequently I judge the curvative effects of the mercurial salt are due more to its antiseptic properties than to its action as an irritant.

The infected area on the left side of No. 2 was given an exposure of fifteen minutes, the patch in the right flank being treated with the iodine and mercury solutions at the same time. On the twelfth day following, the skin on the left side showed considerable evidences of inflammation and many of the hairs in the rayed area could be readily extracted from their follicles. The loosened shafts were removed as thoroughly as possible by friction and the separate antiseptics well rubbed in. In the meantime the spot on the flank had received four treatments with the solutions, both heat and friction being employed. All medication was discontinued on November 15.

Hair development was slow in the depilated area. My notes record, on January 18, the appearance of "a fine lanugo-like growth scattered over the surface," and the outline could still be plainly discerned two months later.

The patch in the right flank improved quite rapidly, almost from the time treatment was first instituted. It still appeared a trifle "moth eaten" on January 1, but was apparently normal four weeks later, an examination of hairs and curette scrapings proving negative.

The disease manifested itself rather slowly in No. 3. Only two patches developed, and in both it seemed as if the organisms confined their attack mainly to the outer layers of the epidermis. There was some hair involvement, however, in addition to very considerable scaling and the formation of numerous minute vesicles, the latter being especially plentiful around the openings of the follicles. The *x*-rays were not used on this animal, four applications of the antiseptic, at three day intervals, being sufficient to bring about a cure. A similar satisfactory result was secured in the case of a fourth rabbit, infected in March, 1908, with the ectothrix.

In five clinical cases, all children, treated with the mixture since February 1, the results have been very satisfactory. The microsporon was the causative fungus in each instance.

One of these patients, a girl of five years, presented the most intractable example of the disease that I have ever encountered. The scalp was attacked at ten or a dozen different points, and new patches were developing and the old ones extending in spite of treatment. This was due, in a large measure, to the neglect of the mother, who failed to carry out the instructions given her. The affected areas were finally depilated (by the fractional method of Sabouraud) and the disease checked, and ultimately eradicated, by the use of the iodine-mercury solutions. While I have never seen any untoward effects following the employment of these drugs, care has always been exercised not to cover too large a field at one time, 30 or 35 square centimeters being about the limit for a child of eight years.

No one realizes better than I the dangers of generalizing from a too limited experience or from insufficient data, but the excellent results secured by this method of treatment, especially in the earlier stages of the disease or as a postdepilatory measure, certainly speak strongly in favor of its routine use in this extremely intractable affection.

REVIEWS.

DISEASES AND SURGERY OF THE GENITO-URINARY SYSTEM. By FRANCIS S. WATSON, M.D., Lecturer on Genito-urinary Surgery in the Harvard Medical School. Assisted by JOHN H. CUNNINGHAM, JR., M.D. 2 vols.; pp. 1101; 454 engravings and 47 colored plates. Philadelphia and New York: Lea & Febiger, 1908.

IN THE accomplishment of his purpose to write this book the senior author labored—like Jacob for Rachel—seven years, but, more fortunate than the patriarch, was able to secure a collaborator for the last three. The outcome is a useful addition to the literature of genito-urinary surgery, an excellent compendium of modern opinion on that subject, and a reliable guide to the operator, partly through the numerous statistical tables of mortality—and other—results, but chiefly by reason of the careful descriptions of the details of approved operative methods.

Volume I deals with the external genitals, prostate, and bladder. The article on chancroid is brief, but satisfactory, though some rather antiquated and space-consuming tables of Fournier's might, with advantage, have been omitted.

The article on cancer of the penis is an abstract of a paper by Barney.[1] A certain carelessness is shown in the arrangement of this material. Under the heading, "Contact with Cancerous Cervix," Barney says: "In this series"—meaning his whole series of 100 cases—"there was not even a suggestion of this being an etiological factor." Later, under "Nationality," he says: "It is worthy of note that the Jewish race does not figure in this list of nations." Watson runs these two statements together under the former heading, with the result, in effect, of asserting, first, that *no one* acquired penile cancer from contact with a cancerous cervix; next, that no Jews acquired it in that way! The matter is worthy of mention because it renders obscure an important and significant clinical fact with an obvious bearing, not only on penile cancer, but also on circumcision and on the causation of cancer in general. In this relation, too, may be noted the use, between quotation marks, of an

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[1] Annals of Surgery, December, 1907.